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Audra J. Bowlus
abowlus@uwo.ca

Haoming Liu

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Audra Bowlus and Haoming Liu

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Department of Economics
Social Science Centre
The University of Western Ontario
London, Ontario, N6A 5C2
Canada

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The Long-term Effects of Graduating from High School During a Recession: Bad Luck or Forced Opportunity?

Audra J. Bowlus
University of Wester Ontario
abowlus@uwo.ca

Haoming Liu
National University of Singapore
ecsliuhm@nus.edu.sg

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Abstract

This paper examines whether local labor market conditions at the time of high school graduation have long-term effects on wages. We find that a higher unemployment rate raises the probability of staying in school after finishing high school of white males, but reduces that of black males. A higher unemployment rate is also found to have a negative and lasting impact on the wages of white males who directly enter the workforce after graduating from high school. The main impetus of these lower wages is a tendency to accumulate less experience over the same time horizon. Thus, for most individuals graduating during a recession represents bad luck. However, for some the forced opportunity of additional years of education results in higher earnings levels.

Keywords: Earnings, Education, Business Cycle

JEL classification: J3, E3

1 Introduction

A relatively large body of literature exists on the effect of labor market conditions on youth unemployment, earnings and school enrollment. Yet little is known about the length of these effects. On the one hand, the effects may be short-lived as business cycle durations, especially recessions, tend to be short. Individuals may be able to quickly rebound from an initial bad state. On the other hand, the effects may be long lasting as early career performance may influence later job prospects. Alternatively, individuals may pursue further education in the face of poor labor market prospects eventually improving their labor market outcomes (e.g. Ellwood 1982, Burgess et al. 2003). In this paper we set out to determine whether the state of the economy when one graduates from high school has a long term effect on earnings and, if so, whether one can avoid this bad luck by pursuing post-secondary education.

Local labor market conditions at the time of high school graduation can affect current and future earnings through several channels. First, business cycle conditions may impact on the success of the school-to-work transition. Since it is harder to find jobs during recessions (e.g. Blanchard and Diamond 1990), individuals who graduate during a recession may take longer to find their first jobs. Further, Bowlus (1995) finds job spells that start in a recession tend to be shorter than those that start in booms. Hence, individuals who finish high school during recessions may accumulate less experience over the same time interval than those who finish during booms. Moreover, the starting wages of the former are also likely to be lower (e.g. Bowlus 1993). These findings suggest that transiting from school-to-work during a recession lowers both entry level and, potentially, future earnings. However, how long these negative effects last is still an open question.

Second, fluctuations in labor market conditions may affect college enrollment rates via changes in the opportunity cost of post-secondary education. Utilizing enrollment data Betts and McFarland (1995) find 2-year community college enrollment levels increase

during recessions. Individual level data yield a less clear picture. For whites Rivkin (1995) and Black and Sufi (2002) find evidence that college enrollment rates increase during recessions, while Kane (1994) finds the local unemployment rate has no effect. For blacks only Rivkin (1995) finds evidence of a significant effect, as both Black and Sufi (2002) and Kane (1994) find no evidence that poor economic conditions raise the college enrollment rate of blacks. Kane (1994) does find that an increase in the local unemployment rate raises the high school graduation rate for black males.

In this paper we first examine whether an increase in local unemployment encourages more students to enroll in college immediately after graduating from high school. Since previous studies tend to find that blacks and whites respond differently to changes in local labor market conditions, we estimate the impact for blacks and whites separately. Our results show that whites indeed tend to stay in school longer, if they finish high school at a time when the local unemployment rate is high. Moreover, the higher high school to college transition rate translates into higher average education levels four to six years after high school. However, for blacks the high school to college transition rate is only marginally significantly related to the local unemployment rate, and the resulting impact on the transition rate has no significant effect on average education levels attained several years after high school. Black and Sufi (2002) also find an insensitive black college enrollment rate with respect to local unemployment rates. They conjecture that the local unemployment rate may not be a good measure of local labor market conditions for blacks.

Having found that the local unemployment rate does have some impact on school choice, we further examine how changes in the local unemployment rate at graduation influence the hourly wages of those who start working after high school and those who stay in education beyond high school. Our results indicate that the entry level wage of white males who transition directly from school-to-work after finishing high school declines as the local unemployment rate at the time of graduation increases and this effect

on wages can last up to 5-7 years. However, an increase in the local unemployment rate at graduation does not have a negative effect on the entry level wages of white males who continued their education beyond high school. For black males the story is different. As with their education decision, their entry level wages do not depend on the local labor market conditions at the time of graduation irregardless of whether they transition directly from school-to-work after high school or they continue their education. This, of course, could be an alternative explanation for why the college enrollment rate of blacks is not sensitive to local labor market conditions.

Finally, for white males our results indicate that the impact of the business cycle at the time of graduation differs depending on enrollment choices. The earnings of those who are college bound irrespective of labor market conditions are impacted very little by the unemployment rate at the time of their high school graduation. In contrast, those who transition from high school to work irrespective of the labor market conditions are clearly worse off if they graduate during a recession. For them the outcome is definitely one of bad luck. There is, however, a third group whose college enrollment decision varies with labor market conditions.[1] That is, when times are bad they stay in school. We find that, if they complete enough post-secondary education, graduating from high school during a recession can actually be a forced opportunity in the sense that their post-education earnings levels are higher than they would have been had they graduated during a boom and immediately entered the workforce.

The remainder of this paper is organized as follows. Section 2 describes the data. Section 3 examines the effect of the local unemployment rate at graduation on the high school to college transition rate. Section 4 investigates how fluctuations in this unemployment rate affect entry level wages and how long the effects last. Finally, conclusions are given in Section 5.

[1]Predictions from our school choice equation indicate that 11% of our white male sample belongs to this group. That is, 11% have a predicted probability of staying in school that is less than 50% when the unemployment rate is low and a greater than 50% chance when the rate is high.

2 Data

To conduct this study we use data from the US National Longitudinal Survey of Youth (NLSY) between 1979 and 2000. Because the survey respondents were between 14 and 21 in 1979 at the start of the sample, we can follow most respondents from their high school graduation through any further education and several years into their employment. This makes the NLSY highly suitable for determining the long term effects of local labor market conditions during the last year of high school.

To limit our analysis to individuals facing the high school-to-work transition decision and their earnings prospects thereafter, we impose some sample restrictions. First, we exclude individuals who graduated from high school before 1979, the first year for which we have local unemployment rates. Individuals who were still enrolled in high school in 1979 but who were more than 20 years old are also excluded. Second, because previous studies (e.g. Angrist 1998) have found that military service influences wages and the decision of joining the military may be correlated with local labor market conditions, individuals who served in the military at any time over the sample period are excluded. Third, we focus solely on high school graduates (as defined below) excluding dropouts and GED recipients. Finally, we examine only males.

We use the following procedure to determine the last year of high school for each individual and whether the individual continued their education or entered the workforce following high school. Individuals who were enrolled in high school as of May 1 of year t and in college in year $t+1$ are treated as having graduated from high school in year t and are coded as continuing their education regardless of their educational attainment at year t. Year t is then taken as their grade 12 year. Individuals, who were enrolled in high school in year t but not in $t+1$ and completed grade 12 in $t+1$, are treated as transiting into the labor force with year t taken as their grade 12 year. Individuals, who were not enrolled in high school and only completed grade 11 as of May 1 of year t, but who were

enrolled in college and completed grade 12 in year $t+1$, are treated as continuing their education with their grade 12 year is defined as year t. Finally, individuals whose high school finishing year cannot be identified by the above procedure are excluded. In what follows, for convenience, we label individuals who go on to post-secondary education as 'school stayers' and those who enter the labor force as 'school leavers.'

We are interested in the effect of local labor market conditions at the time of high school completion on these individuals schooling choices and labor market outcomes. We use the local unemployment rate during grade 12, year t as defined above, as our indicator of the state of the local economy. To distinguish it from other unemployment rates used in the analysis we label this rate the 'grade 12 unemployment rate.' The local unemployment rate in the NLSY is recorded in 6 categories: less than 3.0%, 3.0 - 5.9%, 6.0 - 8.9%, 9.0% - 11.9%, 12.0% - 14.9%, and above 15.0%. We utilize this information to create two different forms for the local unemployment rate variable. For the continuous form we replace the above categories with the midpoints of the intervals. For the categorical form we divide the local unemployment rate into three categories: low containing rates less than 6%, medium containing rates between 6.0 and 11.9% and high containing rates above 11.9%. In our wage regressions we also control for current local and national labor market conditions by including the local and national unemployment rates for the survey year.

Because the local unemployment rate in the NLSY refers to the March rate, hourly wages are taken from respondents' March job. Hourly wages are deflated by the CPI (1982-84=100). Observations whose real hourly wages are less than \$1 or larger than \$150 are excluded from the wage regression. Since we run a panel data model for the wage data, individuals must have three valid wage observations to be included in the wage regressions.

Experience is defined as years since first stopped education minus years enrolled in school after entering labor market.[2] The year the individual first stopped is the grade 12

[2]We experimented with several different measures of experience including years since grade 12, years since attaining highest degree, and actual years of experience. We settled on the above measure because of its consistency across the two groups and because it allows us to include early employment observations.

year for school leavers and is determined as the last year enrolled before entering the work force for school stayers. With this measure of experience we allow both school leavers and school stayers to return to education after they first enter the labor force. However, we do not include these years in our experience measure nor do we include wage observations from years in which individuals are enrolled in post-secondary education institutions. To test for the presence of long-term effects of the grade 12 unemployment rate we interact the three grade 12 unemployment rate categories with the number of years since the individual first stopped acquiring more education. Unlike our experience measure, with this measure of time we do not subtract future years spent in school.

The NLSY also contains detailed family background information, including parental education attainment, occupation, and poverty status. In 1988, a retrospective residential status was added that includes information on when respondents stopped living with their parents. In our analysis, we created an indicator variable based on the occupations of the parents which equals 1 if either parent has a professional or managerial occupation and 0 otherwise. The parental education variable is similar in composition as it equals 1 if at least one parent holds a bachelor degree and 0 otherwise.

The basic sample statistics of the school transition and wage samples are reported in Tables 1 and 2, respectively. The statistics show that black males are less likely to stay in school beyond grade 12 than white males. On average, whites face a higher grade 12 unemployment rate than blacks. Moreover, whites are less likely to live in the south, in a city, and in a large family than blacks. Whites are also more likely to perform better in the Armed Forces Qualification Test (AFQT), earn a higher wage than blacks, and their parents are more likely to hold a bachelor degree and a professional (or management) job. It should be noted that the average years of schooling is higher than grade 12 even for individuals who left school after finishing high school, indicating that some of the school leavers return to school at a later time. Among the school stayers, whites are more likely

to attain a bachelor degree than blacks.

3 Staying in School versus Leaving

The first question we examine is whether grade 12 local labor market conditions affect the high school to college transition rate. To do this, we estimate the following probit model.

$$P(S_i = 1) = \Phi(\beta_0 + \beta_u u12_i + X_i\beta_1) \tag{1}$$

where S_i equals 1 if individual i is a school stayer and 0 if a school leaver, $u12_i$ is the grade 12 unemployment rate in the continuous form, and X_i is a vector of personal and family background characteristics. The latter includes individual i's AFQT score; whether he lived in the south, a rural area or with both parents during grade 12; and parental education and occupation indicator variables. The regression is estimated for white and black males separately.

Table 3 reports the estimation results. Many of the control variables have the expected sign and effect. However, in general the impacts are smaller and less significant for blacks than whites. Here we concentrate on the grade 12 unemployment rate. The results suggest that local labor market conditions during the last year of high school have different effects on white and black high school to college transition rates. While a one percentage point increase in the grade 12 unemployment rate raises the high school to college transition rate by more than 1% for white males, it reduces the black male transition rate by more than 2%. The latter effect is only marginally significant at the 10% level.

It is possible that the different responses of blacks and whites to the grade 12 unemployment rate can be explained by differences in family income levels. The sample statistics reported in Table 1 suggest that the parental education level of whites is higher than that of blacks and the parents of white respondents are also more likely to hold a

professional (or managerial) job. Consequently, the average family income of whites is likely to be higher than that of blacks. Thus, while more whites are attracted to stay in school longer in recessions by the lower opportunity cost, blacks may be forced to look for jobs due to family credit constraints. If this is the case, then the grade 12 unemployment rate should have a negative effect on the high school to college transition rate of whites from low income families.

To test the above argument, we interacted the grade 12 unemployment rate with a family poverty status variable. Although the coefficient on the interaction term was negative for both black and white males, it was very small and never statistically significant. However, it did slightly lower the coefficient on the grade 12 unemployment rate to 0.0276 (0.0162) for whites and increased that for blacks to -0.0433 (0.0385). The results still indicate that, while whites are more likely to become school stayers during recessions, blacks are more likely to be school leavers. Hence, differences in family income levels are unlikely to be the reason for the difference in their responses to local labor market conditions. Similar results have also been found by Black and Sufi (2002), who conjecture that the difference in the response between blacks and whites could be because the local unemployment rate may not a good measure of local labor market conditions for blacks. Unfortunately, we cannot test their conjecture using this data set.

It should be noted that an increase in the high school to college transition rate does not necessarily imply an increase in mean educational attainment. If those individuals for whom the college enrollment decision is most sensitive to the grade 12 unemployment rate are also most likely to dropout of college, then the increase in the high school to college transition rate during recessions need not necessarily lead to an increase in their overall education level. Table 4 reports the impact of the grade 12 unemployment rate on the number of years of education acquired 2, 4 and 6 years after graduating from high school. For white males, the increase in the high school to college transition rate indeed translates

into more years of education, and the effect appears to increase as time passes. However, the decrease in the high school to college transition rate of black males only has a slightly negative impact on the number of years of education 2 years after graduating from high school and has no significant effect 4 and 6 years after.

In summary, our analysis in this section suggests that white males who face tough local labor market conditions during grade 12 tend to stay at school longer. As a result, they are more likely to acquire more years of education than those who faced a favorable labor market at grade 12. However, an increase in the local unemployment rate reduces the high school to college transition rate of black males. Interestingly, changes in the college enrollment rate of black males do not translate into changes in their overall education level, particularly when the education level is measured several years after graduating from high school. The latter suggests black males are able to rebound in terms of educational attainment following an initial reduction in enrollment rates related to poor labor market conditions.

4 Wages and Grade 12 Labor Market Conditions

To examine the effect of the grade 12 unemployment rate on hourly wages, we estimate the following panel data model

$$\ln w_{it} = \alpha_0 + \alpha_u u12_i + \alpha_1 X_{it} + \epsilon_i + \nu_{it} \tag{2}$$

where $\ln w_{it}$ is the log of real hourly wage of individuals i in year t, $u12_i$ is the grade 12 unemployment rate, X_{it} is a vector of independent variables, ϵ_i is an unobservable individual specific effect, and ν_{it} is the error term. The independent variables included in X_{it} are the national and local unemployment rates during year t, years of education and experience in year t, and dummy variables indicating whether the individual lived in the

South or in a rural area in year t. To determine whether $u12_i$ exerts an enduring effect on wages, interactions between $u12_i$ and years since the individual first entered the workforce are also included in the regression.

With panel data we can control for the unobserved individual specific effect using either a random effects or fixed effects approach. Since we are primarily interested in the effect of the grade 12 unemployment rate, which is not time-varying and therefore cannot be identified from a fixed effects specification, our analysis largely depends on the estimates of the random effect model. It is likely, however, that the assumption in the random effects model of independence between X_{it} and ϵ_i does not hold. To minimize the bias introduced by this potential violation of the random effect model, we also include parental education and occupation variables in the regression. In addition, because the results in Section 3 showed the local unemployment rate affects the college enrollment decision, ϵ_i may be correlated with $u12_i$ conditional on individual $i's$ college enrollment decision. To control for the potential bias introduced by self-selection, we estimate equation (2) separately for school stayers and school leavers and include the inverse Mill's ratio estimated from equation (1) in the two wage equations. Finally, we present results from both the fixed effects and random effects specifications and conduct Hausman tests to determine the appropriateness of using random effects.

4.1 School Leavers

Columns (1) and (3) of Table 5 report the estimation results of the random effects model for white and black school leavers, respectively. For white males starting a career during a tough labor market has a significantly negative effect on both entry and future wages. The effect is even larger than the impact of the current local unemployment rate. The entry level effect amounts to a greater than 20% reduction in the hourly wage for those with a grade 12 unemployment rate in the high category and almost a 13% reduction for those

in the medium category. The positive coefficient on the interaction between the grade 12 unemployment rate categories and years since the individuals left high school indicates that this negative effect for white males eventually dies out. For black males hourly wages are also negatively correlated with the grade 12 unemployment rate. However, the coefficients are not statistically significant.

As discussed earlier, the estimates of the random effects model may be inconsistent. To test the validity of the random effects model, we estimated fixed effects models and report the estimation results in columns (2) and (4) of Table 5. For the coefficients on all of the continuous variables, the difference between the fixed and random effects model estimates is small. Hausman test statistics do not reject the random effects model specification at the 5% level for blacks, but the specification is rejected for whites. We suspect that the rejection is mainly driven by the differences in the coefficients on the two location indicator variables. Because school quality differs across locations, it is possible that these variables are correlated with an unobserved quality component ϵ_i that biases the random effects specification. Indeed if we include the average of the south dummy variable and the rural dummy variable and the deviations from these averages in the regression, the Hausman test no longer rejects the random effects model.[3] In addition, the grade 12 unemployment rate coefficients, our main parameters of interest, are not affected by this change. Thus in what follows below we utilize the results from the random effects specification.

Given the estimation results suggest that the difference in hourly wages between those who started working in good times and those who started in bad times declines as time passes, we plot in Figure 1 the three experience–wage profiles to determine how long it takes for the hourly wages to converge. The figure shows it takes about 7-10 years for the white wages to converge. The time to convergence is less clear for blacks with the figure showing it takes at least 14 years.

[3]This specification allows the return to living in a specific location to be different between those who live there continuously and those who move from another location and, thus, implies that the number of years an individual stays in a specific location can have a permanent effect on his wage rate.

Although Figure 1 suggests that hourly wages converge eventually, it does not reveal at what point the differences become statistically insignificant. To answer this question, we replace the interaction between the grade 12 unemployment rate categories and years since left school with interactions between the grade 12 unemployment rate categories and a series of dummy variables that capture ever expanding blocks of time. Initially, we group years since left school into four categories: 1-3 years after, 4-6 years after, 5-9 year after, and 10 years plus. Then we re-estimate equation (2). Next, we increase the time intervals by one year and re-estimate equation (2) again. We keep repeating the process until the time intervals reach eight years long.

These estimation results are reported in Tables 6 and 7 for whites and blacks, respectively. For whites the results indicate the negative impact of a high grade 12 unemployment rate is still significant even after 6 years. However, the impact of a medium grade 12 unemployment rate becomes statistically insignificant after 4 years. Given recessions are generally much shorter than 4-6 years, these results indicate wages do not rebound with the economy but rather the effects are more long-term. The results for black males differ significantly from those for white males as the coefficients on the interaction terms are never statistically significant for blacks. Thus it appears that the experience profiles of black school leavers are not affected by local labor market conditions at the time of high school graduation.

4.2 School Stayers

Columns (1) and (3) of Table 8 report the estimation results of the random effects model for white and black school stayers, respectively. The results show that for white males facing a tough labor market at grade 12 has no significant effect on their starting wage after leaving school. Their experience-wage profile does appear to be flatter than that of those who faced a favorable labor market at grade 12. However, only the coefficient on

the interaction between the median grade 12 unemployment rate category and years since first left school is significant at the 10% level, although the magnitude of the coefficient on the interaction between the high grade 12 unemployment rate dummy and years since first left school is slightly larger. Figure 2a shows the resulting shapes of these profiles.

Given the majority of school stayers complete at least 16 years of education, it is somewhat surprising that there are lingering, albeit limited in significance, effects of the grade 12 unemployment rate. One hypothesis is that the quality of worker who becomes a school stayer is lower when the grade 12 unemployment rate is high. Employers may then overestimate the quality of such workers at the beginning of their career and then over time discount their wages as their true quality is revealed resulting in a flatter profile. Alternatively, if school stayers with a high grade 12 unemployment rate are of a lower quality, then our potential experience measure may be a poor measure of their actual labor market attachment. In fact if we replace our experience measure with a measure of actual experience, all of the coefficients related to the grade 12 unemployment rate categories become insignificant. This latter result suggests that the differences seen in Table 8 and Figure 2a across the grade 12 unemployment rate groups stem from quality differences in the groups that translate into differences in labor force attachment.

Turning now to the results for blacks, we find that the coefficient on the high grade 12 unemployment rate category is surprisingly large and significant. Further scrutiny of the data reveals that there are only eight black males in this category. Therefore, the data do not contain enough observations to accurately identify the coefficients for this category. If we stratify the grade 12 unemployment rate into two groups by combining the previously defined high and median categories and re-run the estimation for blacks, the coefficient on the new high grade 12 unemployment rate dummy variable is now -0.0862 (0.0870), while the coefficient on the interaction term between the new high grade 12 unemployment rate dummy and years since first left school is now 0.0284 (0.0133). Figure 2b shows the

experience-wage profiles for the two different groups. The results suggest that the grade 12 unemployment rate affects the wage growth of black school stayers but not the entry level wage.

The contrast between the white and black wage response to changes in the grade 12 unemployment rate may be related to the differences in the high school to college transition rate noted in Section 3. As shown in Table 4, 4-6 years after graduating from high school whites who faced a high grade 12 unemployment rate obtained significantly more years of education than those who faced lower rates, while the same is not true for blacks who tended to obtain less education. Therefore, for blacks it appears that it is those who faced favorable labor market conditions at grade 12 who are possibly over-rewarded for their postsecondary education, while the wages of those who faced a tough labor market need time to catch up as their true productivity is revealed to their employers.[4] Interestingly, the catch-up effect still remains even after we use actual instead of potential experience for black males.

4.3 Bad Luck or Forced Opportunity?

To answer the question raised in the title, we simulate experience-earnings profiles for three hypothetical individuals. The first hypothetical individual (labeled type 1) has characteristics such that he always chooses to go to college irrespective of the labor market conditions at the time of graduation. The second type (type 2) always starts to work after finishing high school. Finally, the third hypothetical individual (type 3) has characteristics such that he will go to college only if the grade 12 unemployment is high. Because the coefficients on the grade 12 unemployment rate and on its interaction with experience are mostly insignificant for blacks, we focus on whites in this subsection. As the college

[4]Differences in AFQT scores between those who faced a tough labor market and those who faced a favorable market also support the quality difference argument. While the average AFQT score of workers who faced a favorable labor market is 34.25 and 69.72 for blacks and whites, respectively, the corresponding scores are 38.25 and 63.93 for blacks and whites who faced a tough labor market.

enrollment decision of the first two types does not depend on the grade 12 unemployment rate, the earnings variation across grade 12 unemployment rates is largely attributable to luck. For the third type the situation is different. Given education increases with the grade 12 unemployment rate, it is possible that earnings for this type might be higher if the labor market is bad at the time of graduation. Consequently, a bad labor market may provide for a forced opportunity.

To simulate the age-earnings profiles, we need to pick appropriate X values for these hypothetical types. We choose the X values of these types such that the predicted probability of enrolling in college is always higher than 78% for type 1, always smaller than 24% for type 2, and equals 44.5% and 56.4% when the grade 12 unemployment rate is 3% and 13%, respectively, for type 3. Using these X values and the regression results in Tables 5 and 8 we can compute earnings levels for each type for various grade 12 unemployment rates.[5] Specifically, the β's in Table 5 are used to predict the earnings levels under both grade 12 unemployment rates for type 2 and for type 3 when the grade 12 unemployment rate is low, while the β's in Table 8 are used for type 1 under both rates and for type 3 when the grade 12 unemployment rate is high.

Ideally, we would like to compare the lifetime earnings of these three hypothetical individuals when faced with different grade 12 unemployment rates. However, since the oldest individuals in the NLSY sample in year 2000 are still in their earlier 40's, it is not possible to accurately predict lifetime earnings. As a result, we focus on the entry level annual earnings after completing school and the annuity of the present value of the first ten years of annual earnings.[6]

Table 9 reports predicted earnings in the first year of work and the annuity for the first 10 years of earnings for each of the three types under two different grade 12 unemployment rates. The results for type 1 and 2 reflect the regression results. For type 2 who never enroll

[5] All types are assumed to work 50 weeks a year at 40 hours per week.

[6] The present value of the first ten years of earnings is calculated at the beginning of the working life assuming an interest rate of 4%.

in college, both the entry level earnings and the annuity of the first ten years of earnings are sensitive to the grade 12 unemployment rate. Facing a tight local labor market at grade 12 yields entry level earnings that are roughly 20% higher than entering the labor market in a high unemployment state. Although the difference in annual earnings falls gradually, it still translates into a 9% difference in the value of the annuity. In contrast, the earnings of type 1, who always enroll in college, are not very sensitive to the grade 12 unemployment rate. While the entry level earnings in a tight labor market are lower than those in a loose labor market, the annuity of the former is 1.2% higher than that of the latter.

For type 3, whose college enrollment decision depends on the grade 12 unemployment rate, Table 9 shows that both earnings and returns to education are sensitive to the grade 12 unemployment rate. When the grade 12 unemployment rate is high, both entry level earnings and the annuity of the first ten years of earnings increase as the years of education attained increases. In contrast, when the grade 12 unemployment rate is low, the entry level earnings of those with 13-15 years of education are lower than that of those with either 12 or 16 years of education, and the annuity of those with 13 years of education is lower than that of individuals with only 12 years education. Thus one can see why type 3 starts to work after finishing high school when the local labor market is good and stays longer at school when the labor market is bad. For this specific case, finishing high school during a recession provides for a forced opportunity only if type 3 finishes at least two years of college. Only then are the type 3 earnings above the level achieved if the grade 12 unemployment rate is low. Thus, while in general finishing high school during a recession has a negative effect on earnings and is clearly bad luck, for those on the cusp of continuing on with post-secondary education it can provide for a forced opportunity that in the end leads to higher earnings.

5 Conclusion

In this paper we examine the impact of local labor market conditions at the time of high school graduation on college enrollment, educational attainment, entry level hourly wages and experience profiles. In general we find the strongest results for white males. Poor local labor market conditions tend to entice more white males to stay in school after high school with negative and lasting effects on wages for those who directly enter the workforce. This is true even after correcting for the education selection process. This increase in the high school to college transition rate during recessionary times can even translate into a forced opportunity if the individual spends enough time in college. The results are much weaker for black males with only limited effects of grade 12 labor market conditions on those who enrol in post-secondary education following high school. There is some evidence that these latter effects are related to employers incorrectly inferring quality levels from educational attainment signals.

Our findings are consistent with Ellwood (1982) who shows that early spells of unemployment of teenagers can have long-term effects on wages via their impact on labor market experience. In addition, similar evidence has also been documented by Burgess et al. (2003) for the UK. Burgess et al. find that high unemployment levels at age 16-18 have long lasting negative effects on subsequent unemployment for low-skilled workers but no significant impact on mid- or high skilled workers. Interestingly, the negative effects persist much longer in the UK than in the US. Even 18 years after leaving school, the unemployment rate of individuals who graduated during the 1981 recession remains higher than that of those who did not.

Given recessions in the US are relatively short, one might have expected to find entry level effects on wages that dissipate rather quickly with individuals bouncing back from an initial rough start once the economy improves. Unfortunately it appears that the effects of entering the labor market during poor economic conditions are longer lasting than that.

Our finding that it takes white males who enter the labor market during a recession 4-6 years to catch up suggests it takes longer than one business cycle to recover representing a significant loss of income for those individuals. From a policy perspective, these results suggest that it is important, especially during recessions, for those making the school-to-work transition to find stable employment early on and continue to accumulate labor market experience. However, if employers value public and private employment experience differently, simply providing government sponsored jobs to those who fail to find a job in the private sector will likely not offset the loss of private employment experience. Finally, our results suggest that blacks and whites react differently to local labor market conditions both in terms of educational attainment and labor market performance. Understanding the sources of these differences is an important area for future research.

Table 1: Basic Sample Statistics of the School Transition Sample

Variable	White	Black
School stayer	0.486	0.432
AFQT score	52.167	25.448
Grade 12 unemployment rate	8.067	7.591
Lived in the south	0.252	0.562
Lived in rural area	0.257	0.175
Lived with both parents	0.546	0.396
At least 1 parent with a BA	0.389	0.227
At least 1 parent with a manag. job	0.328	0.143
Less than 3 siblings	0.491	0.312
Number of observations	1103	308

Table 2: Basic Sample Statistics of the Wage Samples

Variable	School Leavers		School Stayers	
	White	Black	White	Black
Hourly wage of March job	7.407	6.299	10.489	8.684
Years of experience	7.953	8.188	6.626	7.062
$(\text{Experience})^2/100$	0.874	0.907	0.619	0.688
Years of schooling	12.258	12.25	15.185	14.87
AFQT score	38.783	17.372	65.846	36.486
Lives in the south	0.273	0.594	0.309	0.634
Lives in rural area	0.295	0.222	0.167	0.133
Grade 12 unemployment rate	8.204	7.931	7.690	6.733
National unemployment rate	6.435	6.324	6.039	6.018
Local unemployment rate	7.361	6.557	6.464	6.015
At least 1 parent with a BA	0.216	0.153	0.563	0.279
At least 1 parent hold a manag. job	0.19	0.08	0.445	0.18
No. of observations	6031	1769	4464	1177
No. of individuals	563	176	528	133

Table 3: High School to College Transition

	Whites		Blacks	
	Coefficient	Marginal effect	Coefficient	Marginal effect
AFQT	.0231 (.0018)***	.0092 (.0007)***	.0264 (.004)***	.0104 (.0016)***
Local u at grade 12	.0298 (.0146)**	.0119 (.0058)**	-.0539 (.0297)*	-.0212 (.0117)*
Lived in the south	.2641 (.1027)**	.105 (.0405)***	.3389 (.1791)*	.132 (.0689)*
Lived in rural area	-.4033 (.1027)***	-.1584 (.0392)***	-.1776 (.2266)	-.0689 (.0865)
Lived with both parents	.0404 (.0375)	.0161 (.015)	-.0053 (.0647)	-.0021 (.0254)
At least 1 parent with a BA	.5082 (.1023)***	.2005 (.0395)***	.0773 (.2104)	.0305 (.0831)
At least 1 parent hold a professional job	.2085 (.1051)**	.083 (.0417)**	.268 (.2568)	.1063 (.102)
Less than 3 siblings	.1138 (.0872)	.0453 (.0347)	.4428 (.1714)***	.1745 (.067)***
Constant	-1.7914	–	-.7876	–
Number of observations	1103	–	308	–

Notes: Numbers in parenthesis are standard errors.
*** means significant at the 1% level, ** means significant at the 5% level and * means significant at the 10%.

Table 4: Grade 12 Unemployment Rate and Educational Attainment 2, 4 and 6 Years after Finishing High Schoo

	Whites			Blacks		
	2 years	4 years	6 years	2 years	4 years	6 years
	(1)	(2)	(3)	(4)	(5)	(6)
AFQT score	.0081	.0224	.032	.0094	.0258	.0346
	(.0005)***	(.0013)***	(.0017)***	(.0012)***	(.0029)***	(.0035)***
Grade 12 unemployment rate	.0165	.0348	.0422	-.022	-.0142	-.0149
	(.0047)***	(.0111)***	(.0149)***	(.0095)**	(.0221)	(.0282)
Lived in the south	.0397	.0777	.2025	.1651	.4575	.5576
	(.0317)	(.0748)	(.1021)**	(.0573)***	(.1311)***	(.1682)***
Lived in rural area	-.0597	-.1661	-.2514	-.0562	-.1703	-.2764
	(.0322)*	(.0763)**	(.1027)**	(.0725)	(.1685)	(.2152)
Lived with both parents	.0265	.0409	.0493	-.0186	-.0209	.0702
	(.0117)**	(.0274)	(.042)	(.022)	(.0537)	(.0822)
At least 1 parent with a BA	.216	.4281	.5456	.0764	.1332	.2927
	(.0333)***	(.0792)***	(.1073)***	(.0692)	(.1585)	(.203)
At least 1 parent hold a manag. job	.0623	.2579	.4906	.0297	.261	.3084
	(.0336)*	(.0799)***	(.1087)***	(.0828)	(.1892)	(.2386)
Less than 3 siblings	.0054	.125	.1709	.2639	.3838	.6113
	(.0274)	(.0646)*	(.0881)*	(.0564)***	(.1316)***	(.1645)***
Constant	11.7669	11.3665	11.1017	12.1453	11.9975	11.8945
	(.0531)***	(.1246)***	(.1679)***	(.0978)***	(.2266)***	(.292)***
Number of observations	1065	1029	1083	295	282	299

Note: see footnotes of Table 3.

Table 5: Grade 12 Unemployment Rate and Wages, School Leavers

	Whites		Blacks	
	Random effect (1)	Fixed effect (2)	Random effect (3)	Fixed effect (4)
High grade 12 unemployment rate	-.2226 (.0658)***		-.0824 (.1478)	
Medium grade 12 unemployment rate	-.1279 (.0452)***		-.0267 (.0863)	
Years of experience	.0385 (.0053)***	.038 (.0054)***	.0271 (.0099)***	.0269 (.010)***
(Experience)^2/100	-.0847 (.026)***	-.082 (.0263)***	-.044 (.0487)	-.0415 (.0493)
(Yrs since left school)×(high u12)	.0312 (.0103)***	.0333 (.0104)***	.0066 (.0253)	.0079 (.0259)
(Yrs since left school)^2/100×(high u12)	-.0957 (.0479)**	-.1059 (.0483)**	-.0061 (.1218)	-.0139 (.1252)
(Yrs since left school)^2/100×(Med. u12)	.0217 (.0067)***	.0226 (.0068)***	-.0053 (.0128)	-.0046 (.013)
(Yrs since left school)^2/100×(Med. u12)	-.0704 (.0305)**	-.0755 (.0307)**	.0144 (.0581)	.0106 (.0587)
Years of schooling	.0607 (.0095)***	.0608 (.0125)***	.0625 (.0223)***	.060 (.0317)*
Lives in the south	-.0108 (.0226)	.0276 (.0303)	-.0513 (.0383)	-.0635 (.0485)
Lives in rural areas	-.0528 (.0142)***	-.0382 (.0152)**	.0014 (.0338)	.0188 (.0383)
National unemployment rate	-.0132 (.0045)***	-.0142 (.0046)***	-.0118 (.0093)	-.0125 (.0095)
Local unemployment rate at survey yr	-.0051 (.0022)**	-.0045 (.0022)**	-.0094 (.0045)**	-.0093 (.0046)**
AFQT score	.0057 (.0015)***		.004 (.0032)	
Inverse of Mill's ratio	.1955 (.1143)*		-.0378 (.1908)	
At least 1 parent with a BA	.0772 (.0498)		.0692 (.0693)	
At least 1 parent holds a manag. job	.083 (.0418)**		-.1115 (.0878)	
Constant	.9143 (.1281)***	.939 (.1568)***	.8744 (.3017)***	1.0056 (.3941)**
Number of observations	6000	6000	1749	1749
Number of individuals	559	559	173	173

Note: see footnotes of Table 3.

Table 6: The Long-term Impact of Grade 12 Unemployment Rate on Wages for White Males

	3-year interval	4-year interval	5-year interval	6-year interval	7-year interval	8-year interval
Years of experience	0.0410	0.0427	0.0441	0.0481	0.0521	0.0515
	(0.0043)	(0.0042)	(0.0040)	(0.0038)	(0.0038)	(0.0037)
(Experience)^2/100	-0.0835	-0.0946	-0.0984	-0.1212	-0.1324	-0.1330
	(0.0188)	(0.0192)	(0.0176)	(0.0179)	(0.0164)	(0.0158)
D_1×high u12	-0.1694	-0.1493	-0.1203	-0.0924	-0.0615	-0.0580
	(0.0550)	(0.0522)	(0.0506)	(0.0494)	(0.0487)	(0.0482)
D_2×high u12	-0.0593	-0.0186	-0.0098	-0.0234	-0.0234	-0.0220
	(0.0511)	(0.0494)	(0.0486)	(0.0483)	(0.0477)	(0.0481)
D_3×high u12	-0.0025	-0.0276	-0.0080	0.0064	–	–
	(0.0503)	(0.0502)	(0.0492)	(0.0505)	–	–
D_4×high u12	-0.0045	0.0151	–	–	–	–
	(0.0487)	(0.0507)	–	–	–	–
D_1×Medium u12	-0.0817	-0.0676	-0.0503	-0.0334	-0.0152	-0.0176
	(0.0377)	(0.0364)	(0.0354)	(0.0348)	(0.0344)	(0.0342)
D_2×Medium u12	-0.0199	-0.0039	0.0082	0.0028	-0.0008	0.0035
	(0.0353)	(0.0348)	(0.0344)	(0.0342)	(0.0340)	(0.0342)
D_3×Medium u12	0.0119	0.0154	0.0137	0.0157	–	–
	(0.0352)	(0.0349)	(0.0349)	(0.0357)	–	–
D_4×Medium u12	0.0177	0.0226	–	–	–	–
	(0.0347)	(0.0359)	–	–	–	–

Notes: Numbers in parenthesis are standard errors.
** means significant at the 5% level and * means significant at the 10%. To save space, the coefficients on education, lived in the south, lived in rural areas, the national unemployment rate, the local unemployment rate, AFQT score, the inverse of Mill's ratio, parental occupation and parental education are not reported.
D_1, D_2, D_3 and D_4 are dummy variables that take the value of 1 if wages are observed in the 1st, 2nd, 3rd, or 4th interval, respectively.

Table 7: Long-term Impact of Grade 12 Unemployment Rate on Wages for Black Males

	3-year interval	4-year interval	5-year interval	6-year interval	7-year interval	8-year interval
Years of experience	0.0297	0.0244	0.0236	0.0271	0.0271	0.0259
	(0.0082)	(0.0081)	(0.0076)	(0.0075)	(0.0073)	(0.0071)
(Experience)^2/100	-0.0549	-0.0288	-0.0304	-0.0417	-0.0442	-0.0391
	(0.0372)	(0.0378)	(0.0350)	(0.0354)	(0.0324)	(0.0309)
D_1×high u12	0.0166	-0.0683	-0.0478	-0.0763	-0.0696	-0.0669
	(0.1220)	(0.1130)	(0.1076)	(0.1049)	(0.1033)	(0.1024)
D_2×high u12	-0.1191	-0.0628	-0.0756	0.0150	0.0036	0.0086
	(0.1087)	(0.1057)	(0.1031)	(0.1025)	(0.1001)	(0.1008)
D_3×high u12	-0.0209	0.0372	0.0325	-0.0280	–	–
	(0.1079)	(0.1064)	(0.1038)	(0.1080)	–	–
D_4×high u12	0.0056	-0.0232	–	–	–	–
	(0.1022)	(0.1081)	–	–	–	–
D_1×Medium u12	-0.0320	-0.0523	-0.0633	-0.0363	-0.0427	-0.0484
	(0.0712)	(0.0679)	(0.0659)	(0.0646)	(0.0638)	(0.0633)
D_2×Medium u12	-0.0338	-0.0448	-0.0509	-0.0680	-0.0715	-0.0708
	(0.0654)	(0.0642)	(0.0631)	(0.0625)	(0.0619)	(0.0623)
D_3×Medium u12	-0.0644	-0.0665	-0.0664	-0.0801	–	–
	(0.0645)	(0.0636)	(0.0633)	(0.0648)	–	–
D_4×Medium u12	-0.0773	-0.0766	–	–	–	–
	(0.0629)	(0.0651)	–	–	–	–

Notes: Numbers in parenthesis are standard errors.
*** means significant at the 1% level, ** means significant at the 5% level and * means significant at the 10%. To save space, the coefficients on education, lived in the south, lived in rural areas, the national unemployment rate, the local unemployment rate, AFQT score, the inverse of Mill's ratio, parental occupation and parental education are not reported.
D_1, D_2, D_3 and D_4 are dummy variables that take the value of 1 if wages are observed in the 1st, 2nd, 3rd, or 4th interval, respectively.

Table 8: Grade 12 Unemployment Rate and Wages, School Stayers

	Whites		Blacks	
	Random effect (1)	Fixed effect (2)	Random effect (3)	Fixed effect (4)
High grade 12 unemployment rate	.0793 (.065)		-.7074 (.2188)***	
Medium grade 12 unemployment rate	.0656 (.043)		-.0666 (.0843)	
Years of experience	.0865 (.006)***	.090 (.0061)***	.044 (.0103)***	.0425 (.0105)***
(Experience)^2/100	-.2711 (.0349)***	-.2877 (.0353)***	-.1311 (.0586)**	-.1247 (.0594)**
(Yrs since left school)×(high u12)	-.0176 (.012)	-.0211 (.0121)*	.1515 (.0427)***	.1554 (.0445)***
(Yrs since left school)^2/100×(high u12)	.0167 (.0709)	.0352 (.0714)	-.6689 (.2494)***	-.6524 (.2658)**
(Yrs since left school)×(Med. u12)	-.0145 (.0076)*	-.0162 (.0077)**	.0218 (.0135)	.0224 (.0137)
(Yrs since left school)^2/100×(Med. u12)	.0574 (.044)	.0683 (.0445)	-.048 (.0758)	-.0464 (.0767)
Years of schooling	.0588 (.007)***	.0416 (.0115)***	.1333 (.0166)***	.1485 (.0288)***
Lives in the south	-.0468 (.0241)*	-.0612 (.0317)*	.0034 (.049)	.0604 (.0654)
Lives in rural area	-.0241 (.019)	-.0047 (.0201)	.0026 (.0403)	.0043 (.0431)
National unemployment rate	-.0213 (.006)***	-.0229 (.0061)***	-.0311 (.0112)***	-.0309 (.0114)***
Local unemployment rate at survey yr	-.0101 (.0026)***	-.008 (.0027)***	-.0005 (.0051)	-.0005 (.0053)
AFQT score	.0028 (.0018)		.005 (.0027)*	
Inverse of Mill's ratio	.0049 (.1292)		.1041 (.171)	
At least 1 parent with a BA	-.0148 (.0513)		.0186 (.073)	
At least 1 parent hold a manag. job	.0677 (.0374)*		.0942 (.0869)	
Constant	.9279 (.2435)***	1.4264 (.1775)***	-.3108 (.3495)	-.341 (.4275)
Number of observations	4396	4396	1165	1165
Number of individuals	519	519	132	132

Note: see footnotes of Table 3.

Table 9: Earnings Flows, Calculated at the 1st Year and the First 10 Years of Entering the Labor Market

	High U12		Low U12	
	1 yr	10 yrs	1 yr	10 yrs
Individuals never enroll in a college	8788	10346	10651	11292
Individuals always enroll in a college	14861	16947	13969	17160
College enrollment depends grade 12 rate, with 12 yrs of edu	10604	12485	12852	13627
College enrollment depends grade 12 rate, with 13 yrs of edu	11520	13137	10829	13302
College enrollment depends grade 12 rate, with 14 yrs of edu	12218	13933	11485	14108
College enrollment depends grade 12 rate, with 15 yrs of edu	12958	14778	12181	14963
College enrollment depends grade 12 rate, with 16 yrs of edu	13743	15673	12919	15870

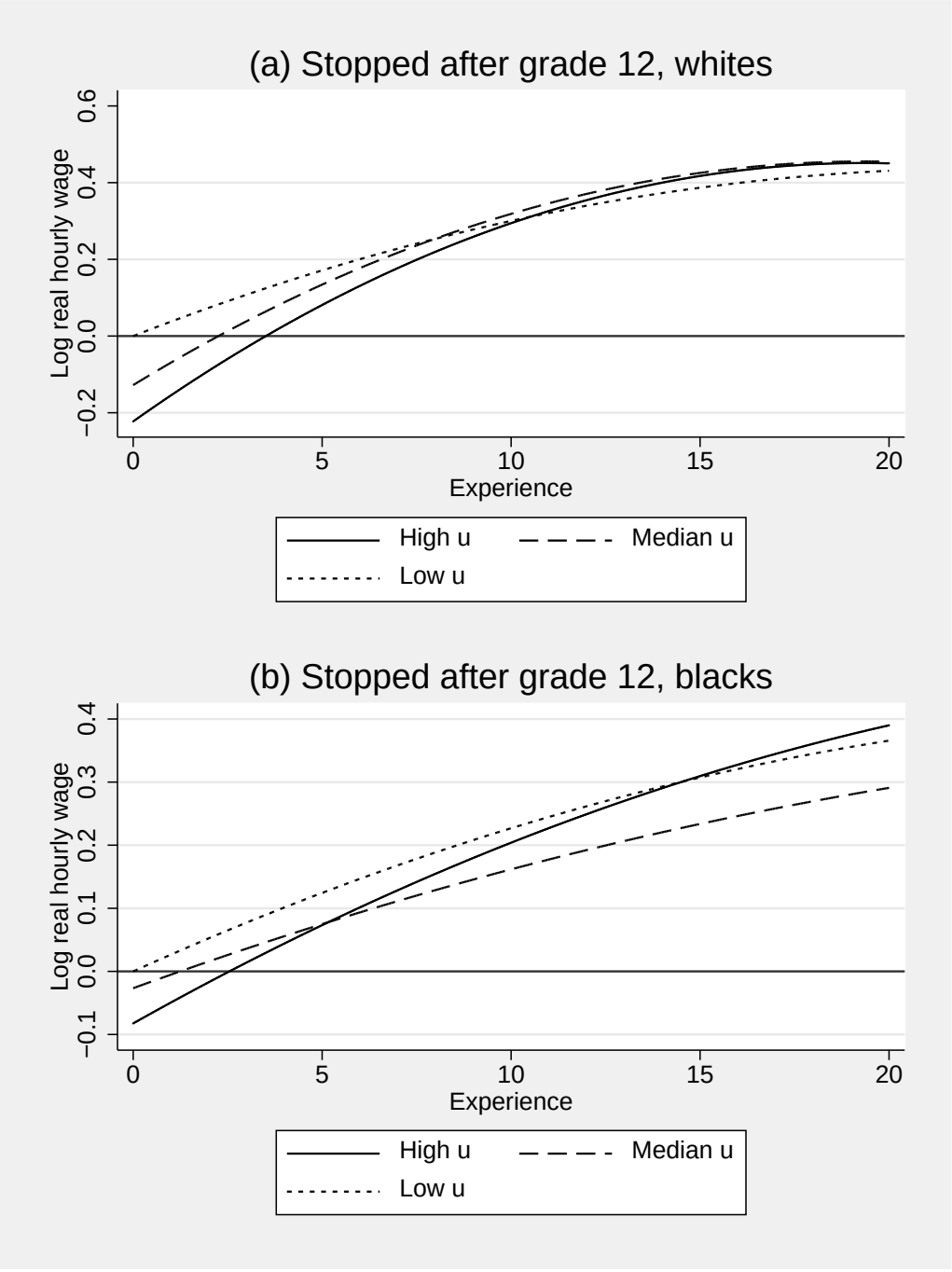

Figure 1: The impact of grade 12 unemployment rate on real hourly wages

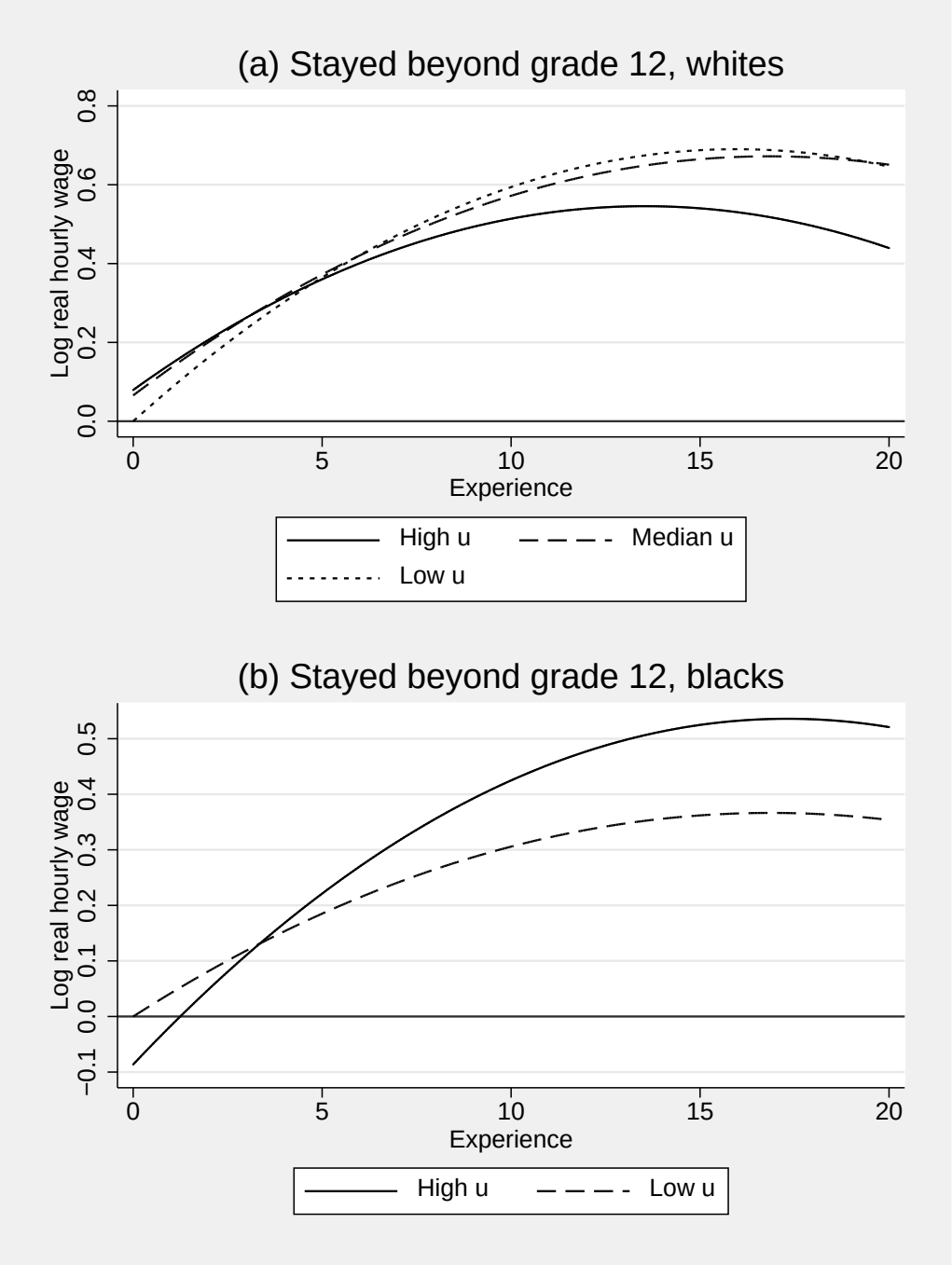

Figure 2: The impact of grade 12 unemployment rate on real hourly wages

References

Angrist, Joshua D. (1998) 'Estimating the labor market impact of voluntary military service using social security data on military applicants.' *Econometrica* 66(2), 249–288

Betts, Julian R., and Laurel L. McFarland (1995) 'Safe port in a storm.' *Journal of Human Resources* 30(4), 741–765

Black, Sandra E., and Amir Sufi (2002) 'Who goes to college? differential enrollment by race and family background.' NBER working paper, 9310

Blanchard, Oliver, and Peter Diamond (1990) 'The cyclical behavior of the gross flows of U.S. workers.' *Brookings Papers on Economic Activity* 2, 85–143

Bowlus, Audra (1993) 'Job match quality over the business cycle: Evidence from panel data.' In *Panel Data and Labour Market Dynamics,* ed. H. Bunzel, P. Jensen, and N. Westergård-Neilson (Amsterdam: North-Holland) pp. 21–41

Bowlus, Audra J. (1995) 'Matching workers and jobs: Cyclical fluctuations in match quality.' *Journal of Labor Economics* 13(2), 335–350

Burgess, Simon, Carol Propper, Hedley Rees, and Arran Shearer (2003) 'The class of 1981: the effects of early career unemployment on subsequent unemployment experiences.' *Labour Economics* 10(3), 291–309

Ellwood, David T. (1982) 'Teenage unemployment: Permanent scars or temporary blemishes?' In *The Youth Labor Market Problem: Its Nature, Causes and Consequences,* ed. Richard B. Freeman and David A. Wise University of Chicago Press Chicago pp. 349–390

Kane, Thomas J. (1994) 'College entry by blacks since 1970: The role of college costs, family background, and the returns to education.' *Journal of Political Economy* 102(5), 878–911

Rivkin, Steven G. (1995) 'Black/White differences in schooling and employment.' *Journal of Human Resources* 30(4), 826–852